

Ali Abosaad

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Summary

- Mechatronics and Robotics Engineer with a recently completed Master degree from York University's Aerospace program, experienced in developing real-time resource-constrained robotic systems, with a strong focus on control, state estimation, and intelligent system integration.
- Strong foundation in machine learning for robotics, with experience applying learning-based methods to perception and state estimation for autonomous systems.
- Background in control theory, estimation, and sensor fusion, integrating learning-based approaches with classical model-based control and Kalman filtering for robust autonomy.
- Proficient in Python, C++, PyTorch, ROS, MATLAB/Simulink, and Git, with experience in software development, hardware-in-the-loop (HIL) testing, system integration, and validation and real-world robotic platforms.

Education

York University – Toronto, ON 2024 - 2026

M.Sc. in Earth & Space Science

Spacecraft, Dynamics, Control & Navigation Lab

- Thesis: *Fast, Reliable, and GPS-Free Navigation for Autonomous Quadrotors using Onboard Sensing and Optimized Visual-Inertial Odometry.*

Nile University – Giza, Egypt

2018 – 2023

B.Sc. in Mechatronics Engineering GPA: 3.65/4.0

- Graduation Project: *Autonomous Fire-Fighting Robot* — Designed a fully autonomous and manual-mode mobile robot capable of detecting and extinguishing fires.

Experience

Research Assistant, York University – Space, Dynamics, Control & Navigation Lab May 2024 – May 2026

- Developed onboard sensing pipelines supporting closed-loop control and state estimation for autonomous UAV navigation under real-time constraints.
- Developed high-fidelity actuator models (steering, throttle, braking) for dynamic simulation and control system validation.
- Integrated perception and control modules in ROS for autonomous aerial platforms.
- Designed state estimation pipelines and integrated them with control loops, accounting for sensor noise, latency, and real-time constraints.

Teaching Assistant – York University

May 2024 – May 2026

- Teaching Assistant for undergraduate Control Systems (e.g. PID) and Physics courses.
- Supported laboratory instruction, grading, and student mentoring.

Control Engineering Intern, Quanser Inc. – Markham, ON

Sept 2024 – Mar 2025

- Led R&D on advancing quadrotor navigation using onboard sensing and optimized visual-inertial odometry.
- Designed and implemented a lightweight navigation pipeline fusing dual IMUs, optical flow, and range sensors for GPS-free autonomous flight.
- Built dynamic system models and designed control loops, validating stability and performance through simulation and hardware-in-the-loop (HIL) testing.
- Developed and tested actuator mechanisms for precision event execution in public demonstrations.

Mechatronics Engineer Intern, Scania – Cairo, Egypt

Feb 2023

- Assisted in developing and validating vehicle dynamics and actuator response models for heavy-duty trucks, focusing on steering and braking performance.
- Supported data collection, analysis, and simulation integration to improve model accuracy for control system testing and validation.

Machine Learning Instructor, DotPy – Egypt

2021 – 2023

- Designed and delivered hands-on training sessions covering supervised/unsupervised learning, deep learning (CNNs, RNNs), computer vision, and reinforcement learning.
- Mentored students through end-to-end machine learning projects, from data preprocessing and feature engineering to model deployment.

Projects

Learning-Enhanced GPS-Free UAV State Estimation – York University

2025

- Developed a real-time, GPS-free UAV navigation system combining onboard sensing with CNN-based perception.
- Applied machine learning to improve feature selection and robustness within vision-inertial state estimation.
- Validated performance through simulation and hardware-in-the-loop testing.

FullThrottle Autonomous Racing Team – ACC 2025 First Place

2025

- Member of the perception team for York University's autonomous racing entry, achieving first place at American Control Conference (ACC) 2025 in Denver, Colorado.
- Developed and tested perception algorithms for high-speed vehicle localization and obstacle detection.

Autonomous Fire-Fighting Robot – Nile University

2023

- Integrated computer vision-based fire detection, automated aiming, and navigation control.
- Achieved 3rd place in Egypt Industry 4.0 Challenge and 5th best graduation project in Egypt.

Self-Balancing 2 D.O.F Twin Rotor Aerospace System

2022

- Designed and controlled a twin-rotor MIMO system for attitude stabilization using rotary encoders.
- Developed control strategies and validated through simulation and real hardware.

Achievements

- **First Place – ACC 2025**, Denver, Colorado: Member of York University's **FullThrottle** autonomous racing team, contributing to the perception subsystem for high-speed navigation. (2025)
- Awarded **3rd Place** in the **Research Evaluation Conference (REC)**, Earth and Space Science Engineering Program, York University, among all Master's thesis students, for the thesis: *"Lightweight Learning-Based Feature Selection for Real-Time Optical Flow Navigation on a Quadrotor Platform"* (2025).
- 3rd place – Egypt Industry 4.0 Challenge (2022) for Autonomous Fire-Fighting Robot.
- 5th best graduation project in Egypt – Cairo International Innovation Exhibition (2023).

Certifications

- Advanced Kalman Filtering for Navigation Systems - Udemy (2025)
- Computer Vision for Autonomous Systems - Udemy (2025)
- AWS Machine Learning Foundations – Udacity (2022)
- Embedded Systems Hardware and Software – NilePreneurs (2022)
- Artificial Intelligence Foundations – DotPy (2021)

Skills

Programming Languages: Python, C++, MATLAB, C/Embedded C, Java

Tools: ROS, Simulink, SolidWorks, Ansys, OpenCV, PyTorch, TensorFlow, Gazebo, CARLA, CUDA

Expertise: Vehicle dynamics modeling, actuator modeling, control systems, PID tuning, stability analysis, computer vision, sensor fusion, simulation, perception systems, machine learning, state estimation, sensor calibration.

Languages: English (Fluent), Arabic (Native)

Publications

- A. Abosaad, J. Shan, *Lightweight Learning-Based Feature Selection for Real-Time Optical Flow Navigation on a Quadrotor Platform*, IEEE International Conference on Robotics and Automation (ICRA), 2026.